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Question

Q1. What is a functional food

b. Describe the different types of functional food

c. With relevant examples, give the clinical implications of functional foods

Q2. What is nutritional status assessment.

b. Describe anthropometric techniques of nutritional assessment and its applications

Q3. Describe nutrition as it relates to life stages

Answer

1. A functional food is a natural or processed food that contains known biologically-active compounds which when in defined quantitative and qualitative amounts provides a clinically proven and documented health benefit, and thus, an important source in the prevention, management, and treatment of chronic diseases of modern age. They are an emerging field in food science due to their increasing popularity with health-conscious consumers and ability of marketers to create new interest in existing products.

1b. The types of functional food are; conventional foods, modified foods, medical foods, and food for special dietary use.

•Conventional Foods

•Conventional foods are the most basic of the functional foods because they haven't been modified by enrichment or fortification; they're still in their natural state. Most whole fruits and vegetables fall into this category because they're rich in phytochemicals such as lycopene and lutein, as well as other beneficial compounds.

•Modified Foods

•Modified foods have been enriched, fortified or enhanced with nutrients or other beneficial ingredients. Calcium-fortified orange juice, folic acid enriched breads and margarine enhanced with plant sterols are functional foods that have been modified. Energy drinks that have been enhanced with herbs such as ginseng and guarana, as well as other potentially controversial foods, also fall into this category.

•Medical Foods

•The FDA defines medical food as "food which is formulated to be consumed or administered enterally under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles, are established by medical evaluation."

•Foods for Special Dietary Use

•Foods for special dietary use are similar to medical foods, but they're available commercially and don't require the supervision of a health care provider.

1c. Clinical implications of functional foods

Mental performance: some functional food could promote optimal mental state and performance. They influence cognitive performance, mood and vitality, reaction to stress, short-term memory, vigilance and attention, and changes in memory during ageing. E.g of such functional foods are glucose, B vitamins, sucrose, and caffeine etc.

Reduce oxidative stress(acts as antioxidants): some functional foods can act as free radical quenchers with an antioxidant effect.They include berries, vitamin C, and vitamin E etc.

Physical performance: functional foods could play a key role in helping us to be more physically active. They include caffeine, specific amino acids, creatine, and carnitine etc.

Cholesterol and lipoprotein metabolism: some functional foods can reduce low density lipoprotein concentrations. These functional foods are mostly soluble fibre which include inulin, oligofructose, phytosterols etc.

Bone health: functional foods can help improve bone health. Calcium, magnesium, vitamin D etc can be used to modify foods and thus help improve bone health.

2. Nutritional status assessment is the systematic process of collecting and interpreting information in order to make decisions about the nature and cause of nutrition related health issues that affect an individual.

A comprehensive nutritional assessment includes

- 1) anthropometric measurements of body composition
- 2) biochemical measurements of serum protein, micronutrients, and metabolic parameters
- 3) clinical assessment of altered nutritional requirements and social or psychological issues that may preclude adequate intake;
- 4) measurement of dietary intake.

2b. Anthropometric Methods

Anthropometric measurements include height, weight, skin-fold thickness, and circumference etc., could detect the change of body composition to assess the nutritional status in specific population groups, including newborn, children under age of five and adults. The advantage of using anthropometric measurements is that routine anthropometric measurements can suggest patterns of growth and development of an individual.

The measured values reflects the current nutritional status & don't differentiate between acute & chronic changes.

Other anthropometric Measurements

- Mid-arm circumference
- Skin fold thickness
- Head circumference
- Head/chest ratio
- Hip/waist ratio

3. Nutrition is the science that interprets the nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism.

The key stages in life include:

- pregnancy
- infancy
- childhood
- adolescence
- adulthood.

Pregnancy

Pregnant and lactating women have increased requirements for both macronutrients and micronutrients. The failure to achieve required intakes may increase risk for certain chronic diseases in their children, sometimes manifesting many years later.

Protein requirements in pregnancy rise to 1.1 g/kg/d (71 g) to allow for fetal growth and milk production. The source of protein may be as important as the quantity, however. Some evidence suggests that protein requirements can be more safely met by vegetable than by animal protein. Meat is a major source of saturated fat and cholesterol; it is also a common source of ingestible pathogens and a rich source of arachidonic acid, a precursor of the immunosuppressive eicosanoid PGE₂.

Pregnant women also should not meet their increased need for protein by the intake of certain types of fish, such as shark, swordfish, mackerel, and tilefish, which often contain high levels of methylmercury, a potent human neurotoxin that readily crosses the placenta. Other mercury-contaminated fish, including tuna and fish taken from polluted waters (pike, walleye, and bass), should be especially avoided. Pregnant and/or lactating women also require increased amounts of

vitamins A, C, E, and certain B vitamins (thiamine, riboflavin, niacin, pyridoxine, choline, cobalamin, and folate). Folate intake is especially important for the prevention of neural tube defects and should be consumed in adequate amounts prior to conception

During pregnancy, a woman's nutritional needs increase to:

- help the growth of breasts, uterus and placenta
- meet the needs of the growing foetus
- lay down stores of nutrients to help the growth of the foetus and in the mother for lactation.

Infancy

The process of producing breast milk is called lactation. Breast milk provides all the energy and nutrients a baby needs for growth and maintenance during the first 4 to 6 months of life. Breast milk provides special proteins, antibodies and white blood cells, which help to protect the baby against infection. It also provides growth factors and hormones, important for the healthy growth and development of the baby.

In the first three days after birth, the mother produces a special form of breast milk called colostrum. It contains less fat, more protein and more protective factors than the breast milk produced later.

A mother who is breast feeding requires extra energy and nutrients. Some of this requirement is supplied through extra stores laid down during pregnancy, in addition to the diet. Energy requirements increase during lactation (it has been calculated that the energy cost of breastfeeding is around 65kcal/day). Mothers who exclusively breastfeed for 3-4 months require an extra 500 kcal/day, on average. There are also increased demand for nutrients, such as calcium and vitamin D.

Childhood

The energy requirements of children increase rapidly because they grow quickly and become more active. This means they have a high energy requirement for their size.

Young children do not have large stomachs to cope with big meals. Therefore, to achieve the relatively high energy intake for their age, they should consume small and frequent meals.

A good supply of protein, calcium, iron, vitamin A and D, as part of a healthy, balanced diet, is essential. Calcium is needed for healthy tooth development, and together with vitamin D, help develop strong bones.

Foods to avoid in childhood

Nuts

- Whole or chopped nuts should not be given to children under 5 years to avoid choking. Some children may also be allergic to nuts.

Deep sea fish

- Shark, swordfish and marlin contain relatively high levels of mercury, which may damage the developing nervous system of children.

Adolescence

The Institute of Medicine recommends higher intakes of protein and energy in the adolescent population for growth. For most micronutrients, recommendations are the same as for adults. Exceptions are made for certain minerals needed for bone growth (e.g., calcium and phosphorus). However, these recommendations are controversial, given the lack of evidence that higher intakes are an absolute requirement for bone growth. Evidence is clearer that bone calcium accretion increases as a result of exercise rather than from increases in calcium intake.

Micronutrient needs in adults 19 to 50 years of age differ slightly according to gender. Males require more of vitamins C, K, B 1, B 2, and B 3; choline; magnesium; zinc; chromium; and manganese. Menstruating females require more iron, compared with males of similar age.

Adulthood

Due to reductions in lean body mass, metabolic rate, and physical activity, elderly persons require less energy than younger individuals need.

A poor diet can lead to diseases such as obesity, cardiovascular diseases, cancer and type-2 diabetes.

To reduce the risk of developing these diseases, it is important to:

- eat a balanced diet with plenty of fruit and vegetables
- opt for healthier fats

- get enough dietary fibre
- keep well hydrated
- stay active
- drink alcohol in moderation
- not smoke.

Life stage	Change in nutrient needs
Pregnancy	<p>Increased requirements: energy, protein, essential fatty acids, vitamin A, vitamin C, B-vitamins (B1, B2, B3, B5, B6, B12, folate, choline) & calcium, phosphorus, magnesium, potassium, iron, zinc, copper, chromium, selenium, iodine, manganese, molybdenum</p>
Lactation	<p>Increased requirements: vitamins A, C, E, all B-vitamins, sodium, magnesium Decreased requirements: iron</p>
Infancy, childhood	<p>Increased requirements: energy, protein, essential fatty acids</p>
Adolescence	<p>Increased requirements: energy, protein, calcium, phosphorus, magnesium, zinc (females only)</p>
Early adulthood (ages 19-50)	<p>Increased requirements for males, compared with females: vitamins C, K; B1, B2, B3, and choline; magnesium, zinc, chromium, manganese Increased requirements for females, compared with males: iron</p>

Middle age (ages 51-70)

Increased requirements:
vitamin B6, vitamin D

Conclusion;

Requirements for energy and micronutrients change throughout the life cycle. Although inadequate intake of certain micronutrients is a concern, far greater problems come from the dietary excesses of energy, saturated fat, cholesterol, and refined carbohydrate, which are fueling the current epidemics of obesity and chronic disease. Clinicians can assist patients in choosing foods that keep energy intake within reasonable bounds, while maximizing intakes of nutrient-rich foods, particularly vegetables, fruits, legumes, and whole grains.